

# Energy Efficiency in Humanitarian Organization Infrastructure: Case Study from Kenya

UNHCR DFAM  
Greening and Sustainability Team

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Greening and  
Sustainability  
Team

# Vision

**People. Planet. Protection.**

*Reduce UNHCR's  
environmental footprint by  
using green solutions and  
become one of the most  
sustainable organizations  
within the UN system.*

# Objectives

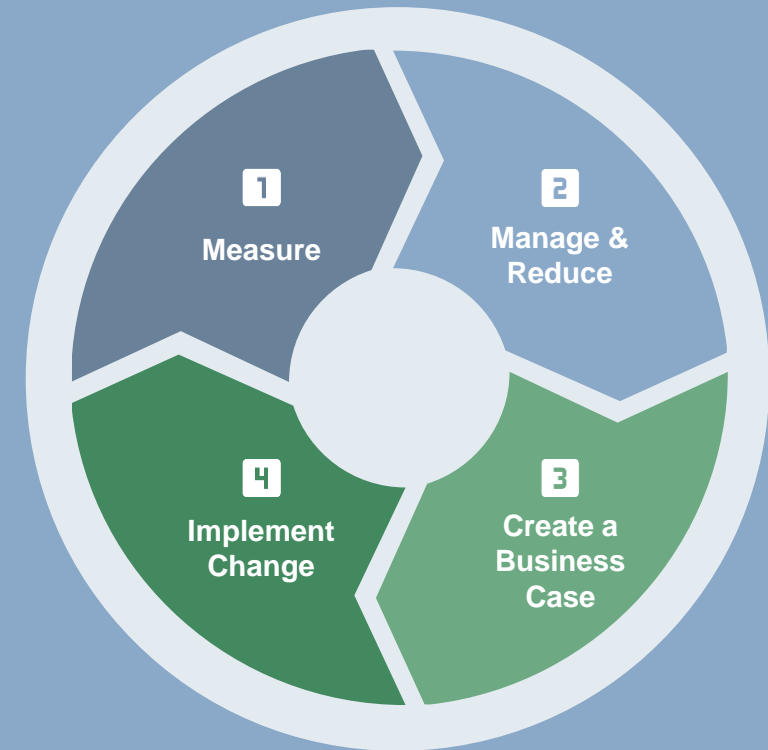


**Remain carbon neutral**



**Reduce UNHCR CO<sub>2</sub>  
emissions by 45% by 2030 <sup>(1)</sup>**

# 4-Step Process



(1) Based on [IPCC target](#): Global net human-caused emissions of carbon dioxide (CO<sub>2</sub>) would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050.



# Greening the Blue

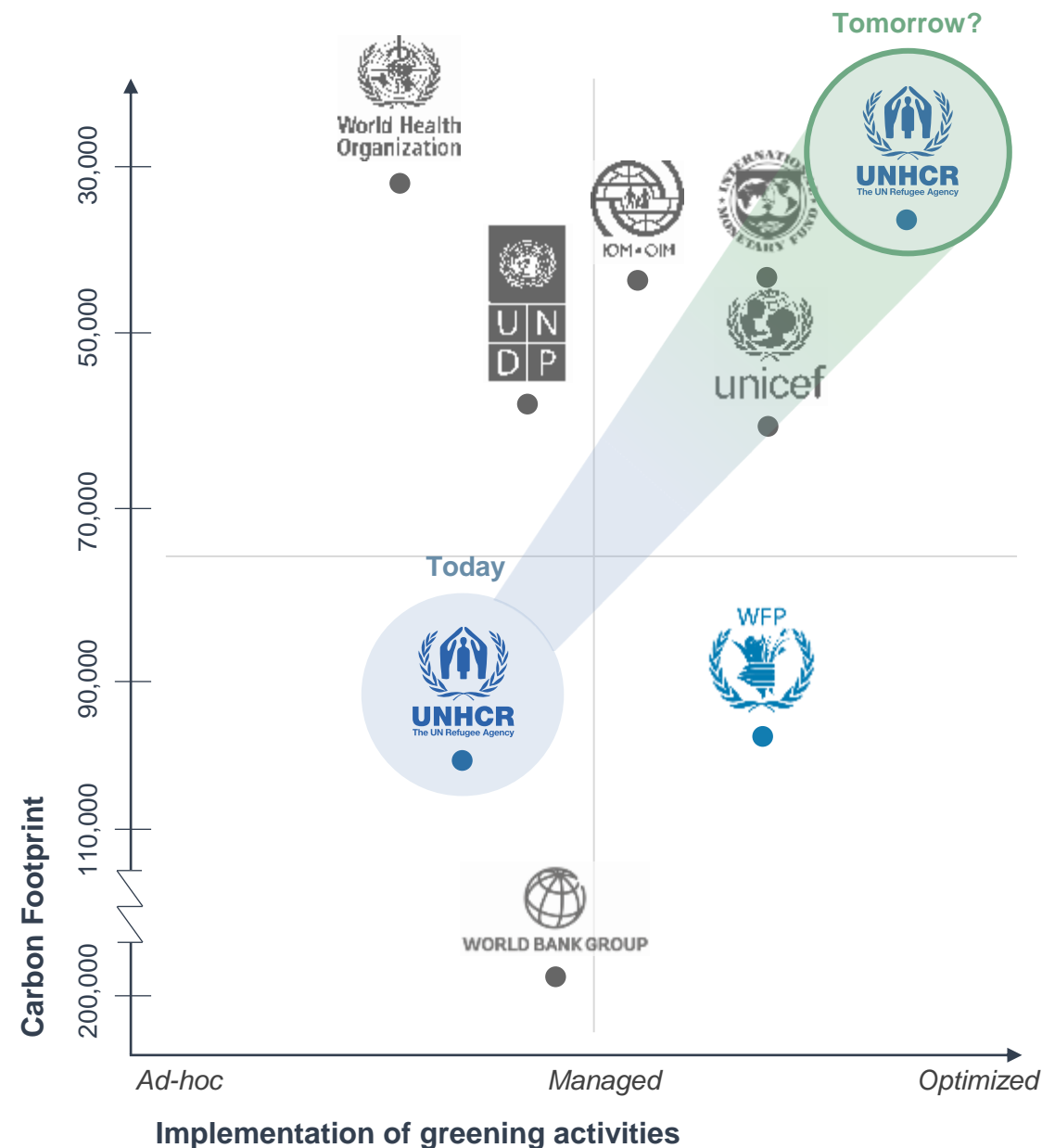
## Greening the Blue Report

### UNHCR Today

- High carbon footprint
- Low implementation of greening activities

### Where do we want to go?

- Optimized global infrastructure
- Leader amongst peer agencies



# UNHCR Framework for Climate Action: Three Pillars

## Pillar I

Law and  
Policy

## Pillar II

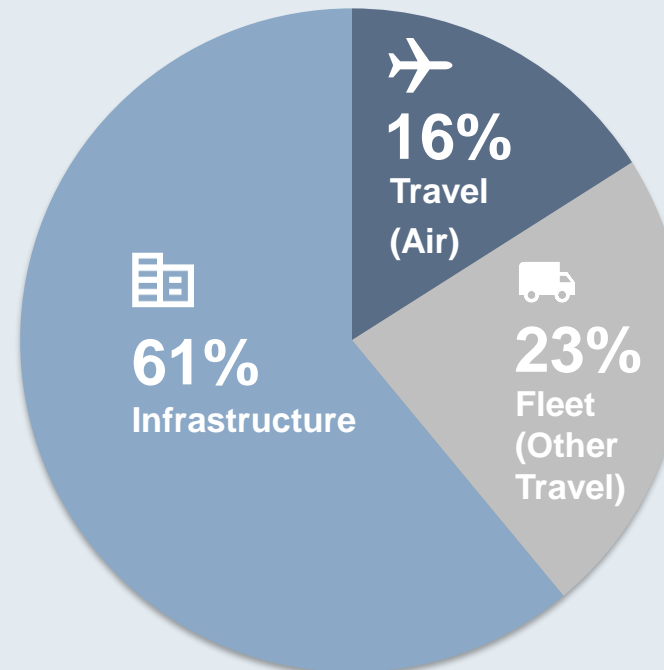
Operations

## Pillar III

UNHCR's  
Environmental  
Footprint

### UNHCR Sources of CO<sub>2</sub>

Greening the Blue Report 2020: UNHCR Data



 **Total Emissions**

**97.136** tCO<sub>2</sub><sup>2</sup> eq

 **Per Capita Emissions**

**5.8** tCO<sub>2</sub> eq/person

 **Average Water Consumption**

**16** m<sup>3</sup>/person

 **Average Waste Generated**

**250** kg/person

# Energy Efficiency & Audit Case Study – UNHCR Kenya

Supported by



Consultants

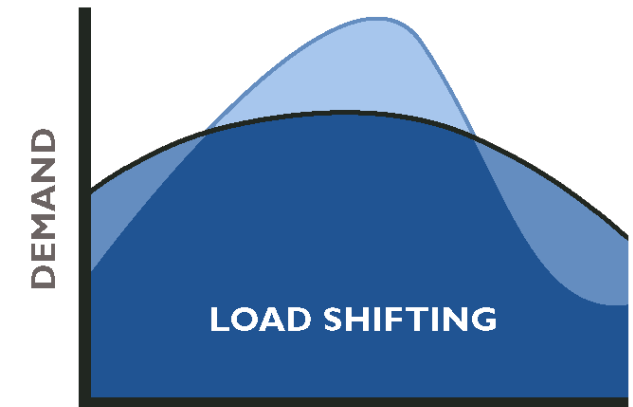
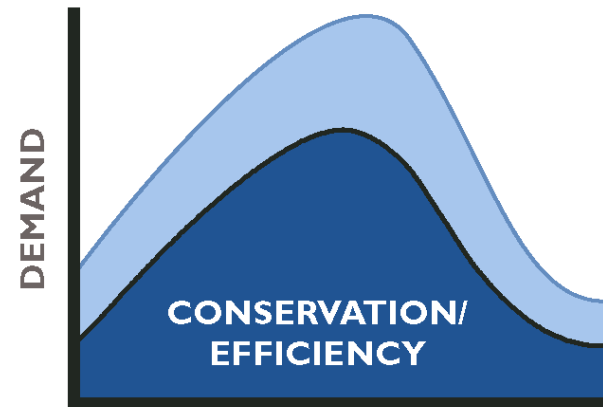
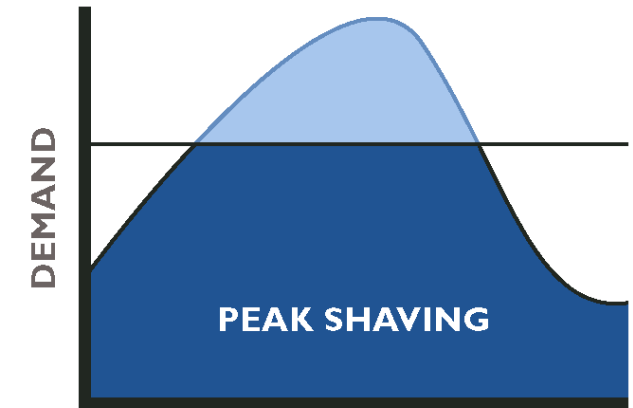
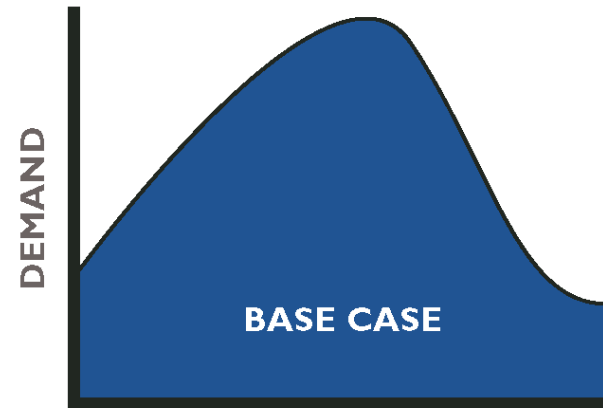


## Objectives of the Energy Audit

- Define Sustainability (zero net-carbon, nearly zero emissions, climate positive, off-grid, no environmental impact, zero operational impact, GHG neutral, Life Cycle Neutral)
- To clearly identify the types and costs of energy used during the selected baseline period.
- To understand how that energy is being used and possibly wasted.
- To identify and analyse alternatives that have the potential to achieve energy savings (behavioural change, new equipment, cost-effective solutions)

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## Load Management



TIME OF DAY

TIME OF DAY

TIME OF DAY

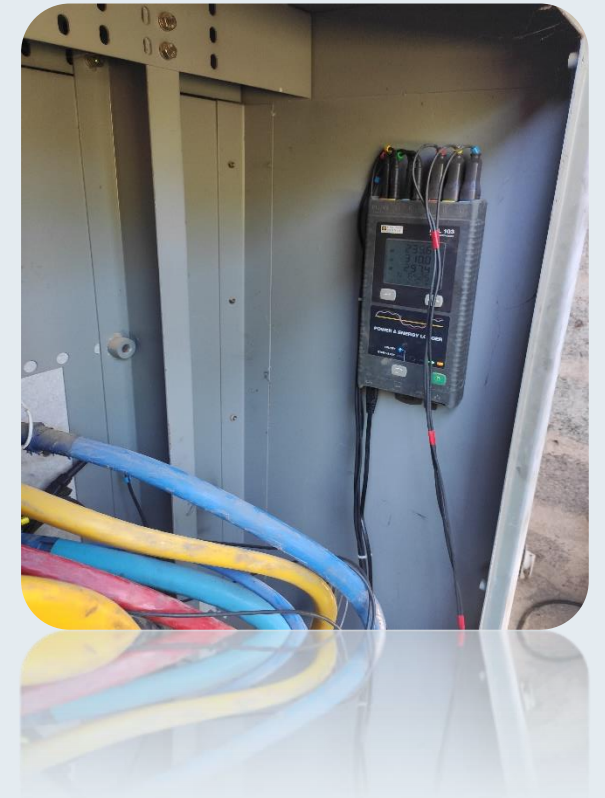
TIME OF DAY

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## Methodology

### Investment Grade Energy Audit

- Preliminary Data Collection (Historical energy consumption data, building envelope, working hours, occupancy, and equipment)
- Detailed Data Collection (Electricity real-time monitoring, power data logging)
- Identify Energy Conservation Measures (Generation, distribution, and operation)
- Financial and environmental analysis

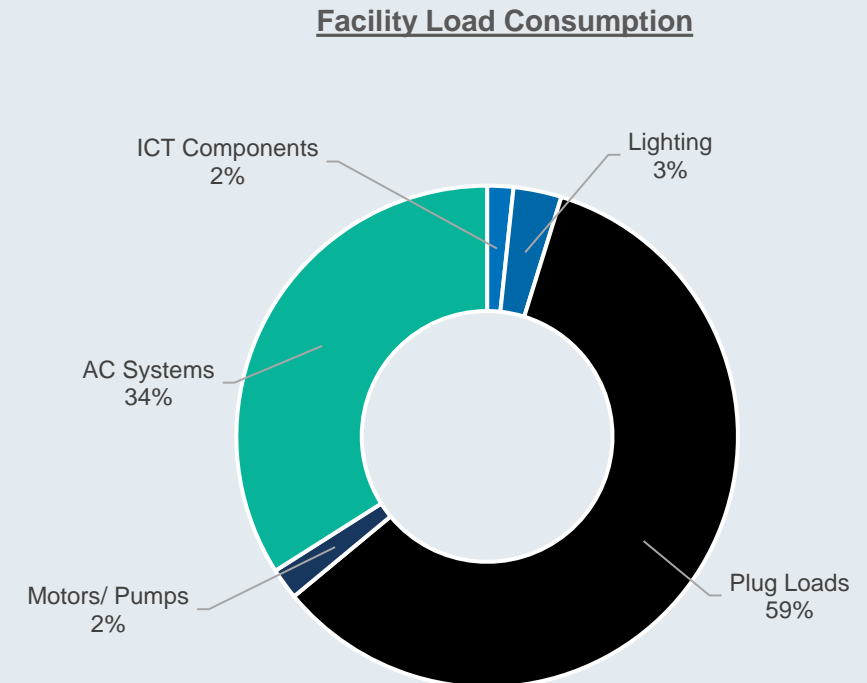


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## Identify Energy Savings Measures

### Four Main Areas

- **Lighting System and Lighting Improvement**
- **Best Practices in Air Conditioning System**
- **Best Practices in Plug-in loads**
- **Energy Management and Real-Time Monitoring**





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## Lighting System and Lighting Improvement

- Lighting represents 3% of the overall electricity consumption of the discussed facility
- Quick wins? (behavioural change, optimize operation hours)

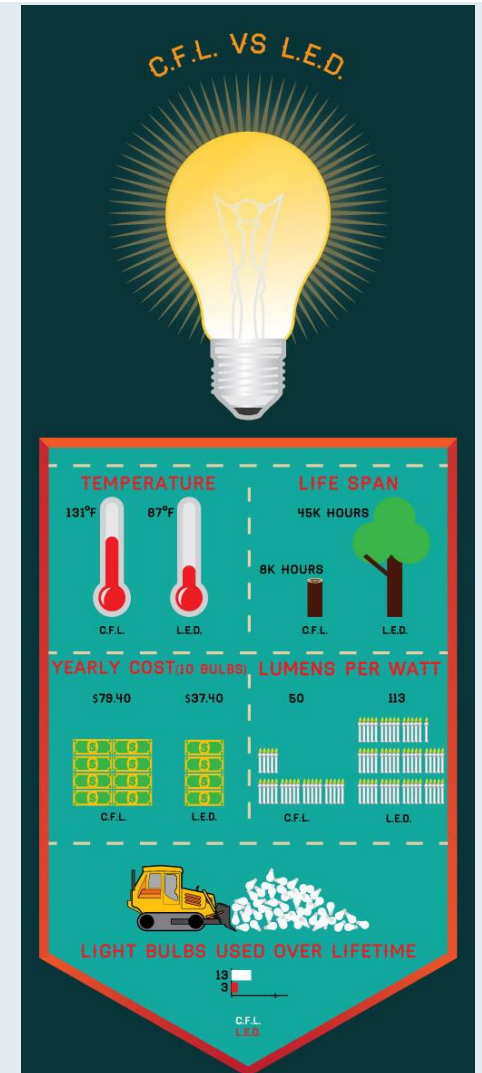
## Current Situation

- 88% of the lighting units is conventional *fluorescent lights*, 1,300 lighting fixtures

## Lighting Efficiency Options

- Bulk re-lamping
- Enhance and maintain system performance
- LED Lamps Replacement

*Law of conservation of energy: Energy can neither be created nor destroyed - only converted from one form of energy to another.*

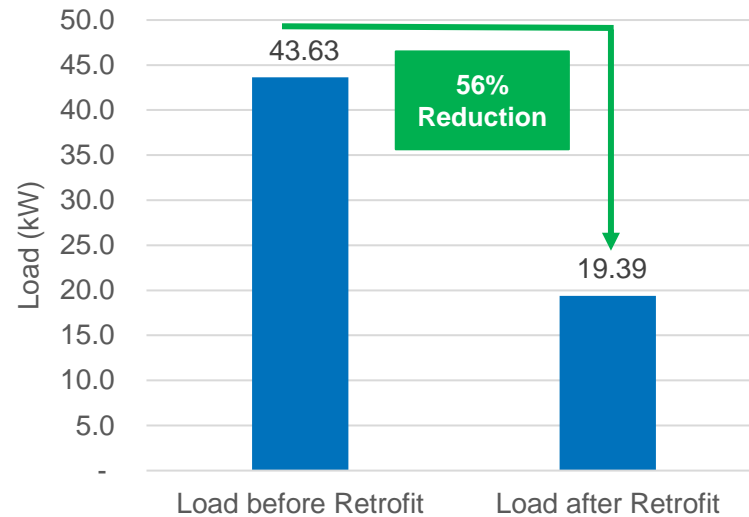


# Energy Efficiency & Audit Case Study – UNHCR Kenya

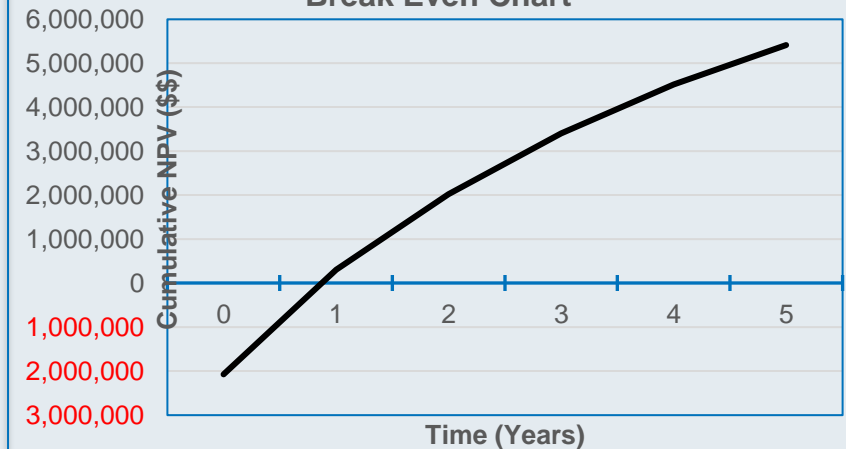
## LED Lamps Replacement

Existing Lighting	Total Unit Wattage	Equivalent LED Lighting	LED Wattage	Projected Savings per Fixture/Lamp	
	W	Luminaire Type	W	W	%
Single 2ft. Fluorescent Tube (T8)	28	Single 2ft. LED Tube (T8)	9	19.0	67.86
14W Compact Fluorescent Lamp	14	7W LED Bulb	7	7.0	50.00
Single 4ft. Fluorescent Tube (T8)	46	Single 4ft. LED Tube (T8)	18	28.0	60.87
11W Compact Fluorescent Lamp	11	5W LED Bulb	5	6.0	54.55
250W Sodium Vapour Floodlight	250	100W LED Floodlight	150	100.0	40.00
100W Sodium Vapour Floodlight	100	50W LED Floodlight	50	50.0	50.00
18W Compact Fluorescent Lamp	18	7W LED Bulb	7	11.0	61.11
Twin 4ft. Fluorescent Tube (T8)	46	Twin 4ft. LED Tube (T8)	18	28.0	60.87

Lighting Loads Comparison



Break Even Chart



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## Best Practices in Air Conditioning System

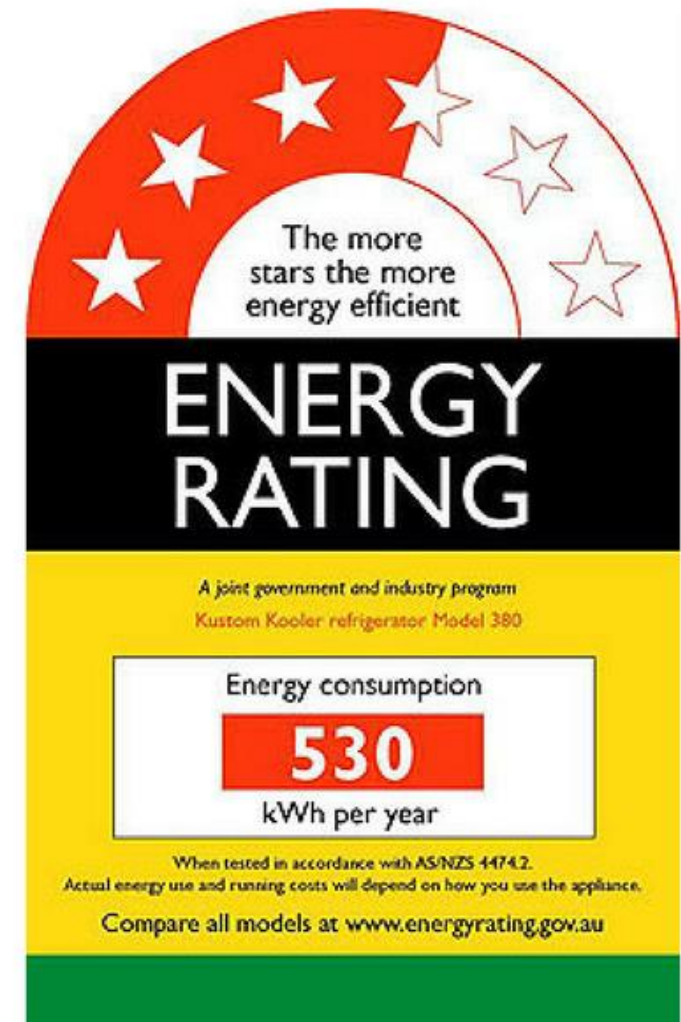
- Quick wins? (close doors and windows when the AC is on, set AC temperature at 24)

## Current Situation

- ACs represents 34% of the overall electricity consumption of the discussed facility

## Lighting Efficiency Options

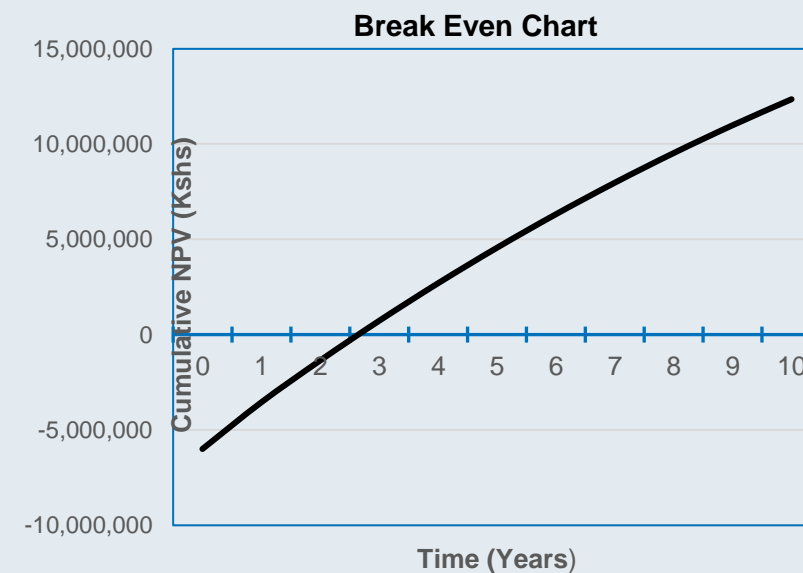
- Ensure good maintenance practices
- Proper air conditioners sizing
- Utilize Energy Efficient Variable Refrigerant Flow Technology



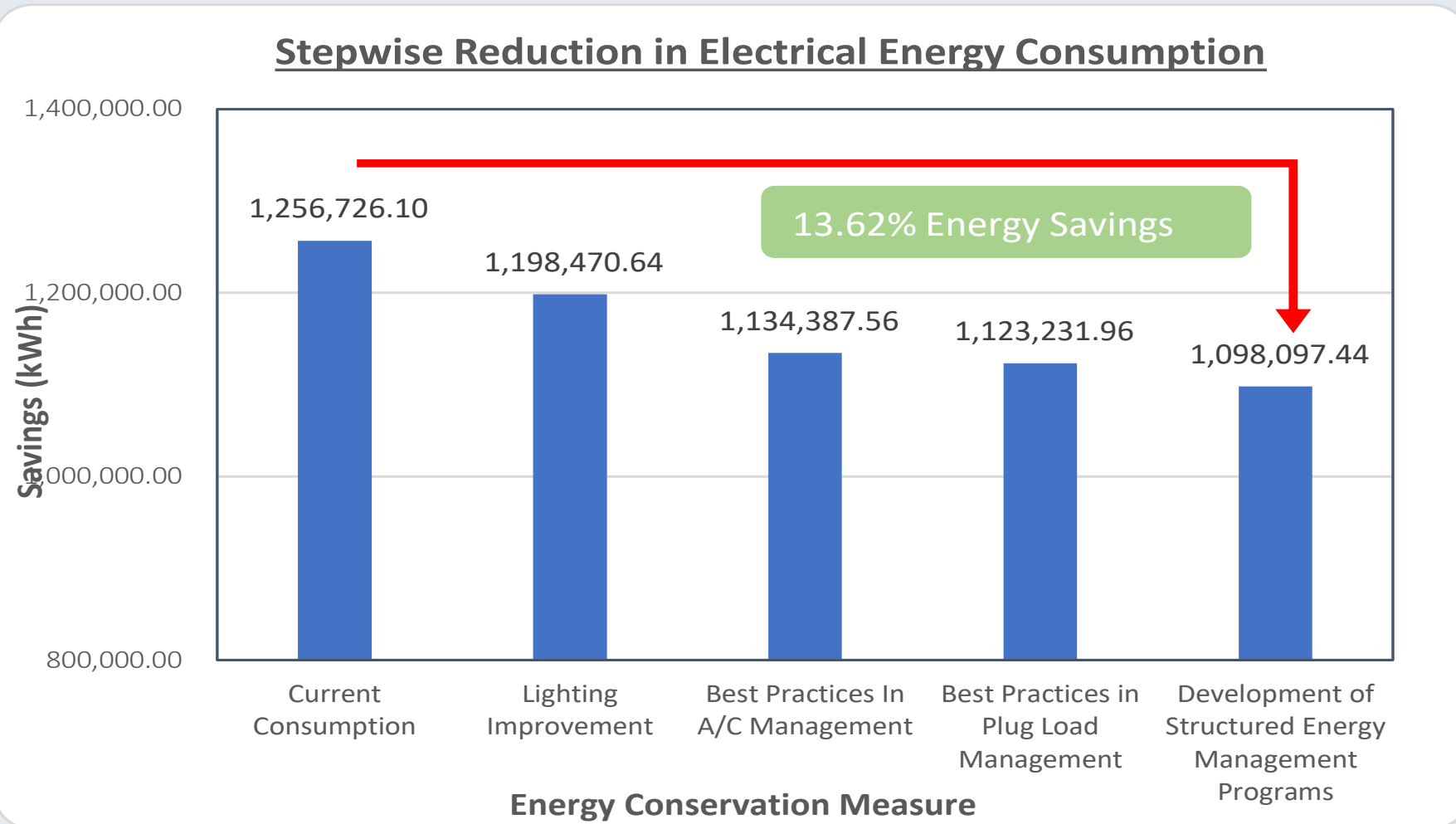
# Energy Efficiency & Audit Case Study – UNHCR Kenya

## Best Practices in Air Conditioning System

Best Practices in Air Conditioning Systems		
Parameter	Unit	Value
Estimated Energy Savings through Best Practices in A/C Systems	Percent	15%
Facility Annual Electricity Consumption	kWh	1,256,726.10
The proportion of Energy Consumption from A/C Systems	Percentage	34%



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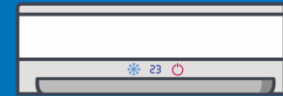


# Behavioral Change

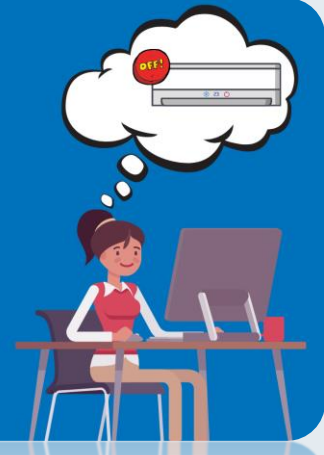
Turn lights off when not in use



Keep all windows and doors properly closed, where air conditioning is installed and running.



! SWITCH OFF office and house air conditioners when not necessarily needed, and when leaving the office/house



A woman with dark curly hair, wearing a yellow long-sleeved shirt, dark trousers, and a grey face mask, is crouching on the ground. She is holding a small green sapling with both hands, preparing to plant it. To her left, a person in a green camouflage uniform and white gloves is also crouching, holding the same sapling. The background is blurred, showing other people and foliage. The text "Thank you!" is overlaid in white in the center of the image.

# Thank you!



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